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BUILT LIQUID DETERGENT

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(57) Claim

1. An aqueous built liquid detergent composition capable of suspending particulate material, which comprises from 1% to 15% by weight of a synthetic anionic detergent-active material, from 1% to 60% by weight of electrolyte, and from 0.5-10% by weight of a fatty alcohol polyalkylene oxide carboxylate salt or a mixture of such salts according to the formula:

$$R\text{-}(OC_nH_{2n})_x\text{-}O(CH_2)_y\text{-}COOM$$

wherein R is an aliphatic hydrocarbon group having 8-20 carbon atoms or an aliphatic-aromatic hydrocarbon group having 4-20 carbon atoms in the aliphatic part; n is a number in the range of from 2 to 3 inclusive; x is a number in the range of from 1 to 16 inclusive; y is a number in the range of from 0 to 2 inclusive; and M is a hydrogen, alkali metal, ammonium, or a mono-, di- or triethanolammonium.

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COMPLETE SPECIFICATION

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Complete Specification for the invention entitled: ~~LIQUID DETERGENT COMPOSITION~~.
"Aqueous detergent compositions containing fatty alcohol polyalkylene oxide carboxylates"

The following statement is a full description of this invention, including the best method of performing it known to m :—

~~LIQUID DETERGENT COMPOSITIONS~~ "Aqueous detergent compositions containing fatty alcohol polyalkylene oxide carboxylates"

The present invention relates to liquid detergent compositions and in particular to aqueous built liquid detergent compositions comprising a detergent active-based suspending system capable of suspending undissolved material.

Aqueous built liquid detergent compositions are well known and a vast amount of formulations have been described in the prior art. Generally such compositions comprise one or more detergent-active compounds and one or more builder salts in an aqueous medium which is capable of suspending undissolved builder and/or adjuvant materials.

However, an important disadvantage of this type of conventional built liquid detergent is its extreme sensitivity to electrolyte level. This sensitivity results in formulation regions of physical stability and acceptable viscosity which greatly vary in magnitude and position as a function of the amount of dissolved electrolyte. In particular, sufficient quantities of the more soluble builders, such as NTA, are difficult to incorporate without rendering the liquid unstable and liable to precipitation or phase separation.

It is therefore an object of invention to provide compositions of the above type which have reduced sensitivity to electrolyte material and which tolerate larger quantities of such material without giving rise to unacceptable viscosities.

It has now been found that inclusion of relatively small quantities of specific fatty alcohol polyglycolether-derived anionic surfactants, optionally replacing part of the conventional anionic surfactant, reduces the

sensitivity of the rheology to electrolyte materials, in particular, to builder and simple electrolyte salts.

Accordingly, the present invention provides an aqueous built liquid detergent composition capable of suspending particulate material, which comprises a synthetic anionic detergent-active material and electrolyte salts, characterized in that it comprises from 0.5-10% by weight of a fatty alcohol polyalkylene oxide carboxylate salt or a mixture of such salts according to the formula :

$$R\text{-}(OC_nH_{2n})_x\text{-}O(CH_2)_y\text{-}COOM$$

wherein R is an aliphatic hydrocarbon group having 8-20 carbon atoms or an aliphatic-aromatic hydrocarbon group having 4-20 carbon atoms in the aliphatic part; n is a number in the range of from 2 to 3 inclusive; x is a number in the range of from 1 to 16 inclusive; y is a number in the range of from 0 to 2 inclusive; and M is a cation.

The alkyl polyalkylene oxide carboxylate salt of the present invention is characterized by the formula :

$$R\text{-}(OC_nH_{2n})_x\text{-}O(CH_2)_y\ COOM$$

wherein R is an aliphatic hydrocarbon group having 8-20 carbon atoms or it may be an aliphatic-aromatic hydrocarbon group having 4-20 carbon atoms in the aliphatic part. R will normally comprise a mixture of aliphatic hydrocarbon groups of different lengths which may be straight or branched, saturated or unsaturated. Preferably R is a straight saturated aliphatic hydrocarbon group having from 1-14 carbon atoms.

The polyalkylene oxide portion $(OC_nH_{2n})_x$ preferably comprises only ethylene oxide units (n=2) but also

propylene oxide or mixtures of propylene oxide and ethylene oxide are suitable ($2 < n \leq 3$). The number of ethylene and/or propylene oxide units (x) may range from 1-16, in particular from 1-12. Preferably the alkylene oxide portion comprises from 2-5 ethylene oxide units.

The carboxylate portion ($(CH_2)_y$-COOM) preferably comprises no alkyl chain (y=0), but short alkyl chains such as methylene and ethylene are also suitable. M is a cation and is selected from the group of hydrogen, sodium, potassium, ammonium, mono-, di- and triethanol ammonium, the alkali metal cations being preferred.

In the detergent compositions according to the present invention the fatty alcohol polyalkylene oxide carboxylate salt or a mixture of such salts is included in an amount of from 0.5-10%, optionally partly replacing the synthetic anionic detergent-active material. The preferred amount depends on the rheology of the composition without the carboxylate salt compound, and the rheology which is aimed at. In general the best results are obtained when the fatty alcohol polyalkylene oxide carboxylate salt is included in an amount of from 2-5% by weight, replacing about an equivalent amount of synthetic anionic detergent active material.

The invention is particularly applicable to aqueous liquid built compositions on the basis of synthetic anionic detergent-active material and electrolyte salts. Suitable synthetic anionic detergent-active materials comprise the well-known anionic detergents of the alkylaryl sulphonate type, the alkyl- and alkyl-ether sulphate type, the alkane- and alkene sulphonate type, etc. Numerous other examples can be found in Schwartz, Perry "Detergents and Surface-Active Agents", Vol. II, 1958.

Preferably alkylaryl sulphonates are used, in which the alkyl chain contains 10-18 carbon atoms, such as n-dodecyl benzene sulphonate, tetrapropylene benzene sulphonate, n-pentadecyl benzene sulphonate, and linear C_{12}-C_{15} alkylbenzene sulphonate in which the aliphatic group is obtained from cracked wax polymers, all in the form of their sodium or potassium salts.

The total amount of synthetic anionic detergent active materials lies within the range of 1-15% by weight, preferably 6-12% by weight of the total composition.

Although the anionic materials are the major detergent-active constituents, small amounts of other detergent-active materials can be tolerated, in particular nonionic detergent-active materials. Nonionic detergents usually consist of a hydrophobic moiety which has been reacted with an alkylene oxide.

Suitable examples are primary or secondary, straight or branched chain C_8-C_{18} alcohols condensed with 1-30 moles of alkylene oxide; mono- or dialkyl phenols with an alkyl group of 9-18 carbon atoms condensed with 1-30 moles of alkylene oxide; C_{10}-C_{18} fatty acid mono- or dialkylol amides condensed with 1-30 moles of alkylene oxide; block copolymers of different or identical alkylene oxides and so on. Usually the alkylene oxide is ethylene oxide, but propylene oxide or a mixture of ethylene oxide and propylene oxide can also be used. Further suitable examples can be found in the text book of M.Schick "Nonionic Surfactants".

The amount of nonionic detergent-active material which can be included in the composition ranges up to 5%, but such amounts should be less than the amount of synthetic anionic detergent active material.

The electrolytes which are used in the present invention are those which cause partial salting out of the detergent active material. In general the composition may contain from 1-60% by weight, preferably 3-50% by weight and particularly preferably 5-30% by weight of the electrolyte.

Typical examples are builder salts, such as the alkali metal ortho- and pyrophosphates, the alkali metal ammonium tripolyphosphates, such as sodium tripolyphosphate, the alkali metal citrates, alkali metal salts of nitrilo triacetate and alkali metal salts of carboxy methyloxy succinate.

Suitable examples of electrolytes are also buffering agents, such as the alkanol amines, in particular triethanol amine, alkali metal carbonates, alkali metal borates, alkali metal silicates, and so on.

The compositions of the invention may further contain all ingredients usually encountered in such products, such as alkali metal sulphites, for improving detergency; enzymes, either alone or in combination with enzyme stabilizers, such as polyalcohols or alkanol amines with borax; fluorescers, further builders, such as zeolites; abrasives, such as calcite; soil-suspending agents; anti-redeposition agents; hydrotropes, corrosion inhibitors; foam boosters or depressors; opacifying agents; perfumes; colouring agents; bleaching agents, optionally in combination with bleach precursors; fluorescers.

The products of the present invention can be prepared using conventional techniques. In this respect it has been found that it is advantageous to shear the product at the end of the production process to its maximum stable viscosity, e.g. by post-stirring or passing the

product through a desintegrator or similar high-shear exerting equipment. Further shear exerted on the product thus treated during pumping and bottling does not affect the viscosity of the product.

The invention will now be further illustrated by way of example, in which all percentages are by weight of the final composition.

Example

Compositions were prepared according to the formulations listed in Table 1, having good physical stability and clearly showing the increased tolerance to high electrolyte levels.

TABLE 1

Ingredients	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Akypo* RLM 25	3	4	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Akypo RLM 45	-	-	-	-	-	4	5	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Akypo RLM 100	-	-	-	-	-	-	-	-	-	3	4	5	5	5	5	5	5	-	-	-	-	-	-	-	-	-	-
Akypo L 140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	5	-	-	-	-	-	-	-	-
Akypo RLM 160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	5	9	-	-	-	-
Akypo O 60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	4	9
Dodecyl benzene sulphonic acid	6	6	6	4	2	6	-	5	5	7	6	5	5	5	-	-	-	7	5	7	7	5	1	9	7	6	1
Sodium lauryl sulphate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5	-	-	-	-	-	-	-	-	-	-	-
Sodium lauryl polyether sulphate	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-
C_{12}-C_{15} fatty alcohol condensate with 3 moles of ethylene oxide	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium nitrilo-triacetate.1 aq.	-	-	15	20	-	10	40	-	-	15	25	-	20	25	20	25	20	15	20	20	15	20	30	-	20	25	30
Sodium tripoly-phosphate anh.	25	25	-	-	25	-	-	25	25	-	-	25	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-
Sodium sulphite anh.	8	8	-	-	8	-	-	-	8	-	-	8	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-
Water balance																											

(*) Akypo is the trade-name for a series of fatty alcohol polyglycolether carboxylates sold by Chem-Y, The Netherlands.

Akypo RLM 25 : sodium lauryl poly (2.5) ethylene oxide carboxylate

Akypo RLM 45 : sodium lauryl poly (4.5.) ethylene oxide carboxylate

Akypo RLM 100: sodium lauryl poly (10) ethylene oxide carboxylate

Akypo L 140 : sodium lauryl poly (14) ethylene oxide carboxylate

Akypo RLM 160: sodium lauryl poly (16) ethylene oxide carboxylate

Akypo O 60 : sodium oleyl poly (6) ethylene oxide carboxylate

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An aqueous built liquid detergent composition capable of suspending particulate material, which comprises from 1% to 15% by weight of a synthetic anionic detergent-active material, from 1% to 60% by weight of electrolyte, and from 0.5-10% by weight of a fatty alcohol polyalkylene oxide carboxylate salt or a mixture of such salts according to the formula:

$$R\text{-}(OC_nH_{2n})_x\text{-}O(CH_2)_y\text{-}COOM$$

wherein R is an aliphatic hydrocarbon group having 8-20 carbon atoms or an aliphatic-aromatic hydrocarbon group having 4-20 carbon atoms in the aliphatic part; n is a number in the range of from 2 to 3 inclusive; x is a number in the range of from 1 to 16 inclusive; y is a number in the range of from 0 to 2 inclusive; and M is a hydrogen, alkali metal, ammonium, or a mono-, di- or triethanolammonium.

2. A composition according to claim 1 wherein R is a straight saturated hydrocarbon group having from 1 to 14 carbon atoms.

3. A composition according to claim 1 or 2 wherein n=2.

4. A composition according to any one of the preceding claims wherein x is 2 to 5.

5. A composition according to any one of the preceding claims wherein y is 0.

6. A composition according to any one of the preceding claims wherein M is an alkali metal ion.

7. A composition according to any one of the preceding claims which comprises of from 2 to 5% by weight of the fatty alcohol polyalkylene oxide carboxylate salt.

8. A composition according to any one of the preceding claims wherein the total amount of synthetic anionic detergent-active materials lies within the range of from 6 to 12% by weight.

9. A composition according to any one of the preceding claims which further comprises up to 5% by weight of a nonionic detergent-active material, the amount of nonionic detergent-active material being less than the amount of synthetic anionic detergent-active materials.

10. A composition according to any one of the preceding claims which comprises 5 to 30% by weight of the electrolyte.

DATED THE 21ST DAY OF SEPTEMBER 1988
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